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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,095	03/01/2004	Yong Gang Jin	27-067.D1	2465
22898	7590	08/06/2004	EXAMINER	
THE LAW OFFICES OF MIKIO ISHIMARU 1110 SUNNYVALE-SARATOGA ROAD SUITE A1 SUNNYVALE, CA 94087			NGUYEN, THANH T	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 08/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/791,095

Applicant(s)

JIN ET AL.

Examiner

Thanh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30-45 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 30-45 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 30-31, 36, 41-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Chiu et al. (U.S. Patent No. 6,586,322).

Referring to figures 3a-3k, Chiu et al. teaches a method for the creation of a torch bump comprising the steps of:

a substrate (12), the substrate having been provided with a contact pad (15) over the surface thereof, a patterned and etched layer of passivation (14) having been deposited over the substrate, exposing the contact pad, a layer of UBM (16) having been blanket deposited over the layer of passivation including the exposed surface of the contact pad,

a base of the torch bump (26/28) having been created overlying the contact pad using a pattern and developed first layer of dry film (38) as a mask,

a layer of solder (30) of the torch bump having been created overlying the base using a patterned and developed second layer of dry film as a mask (22),

the patterned and developed first and second layers of dry film have been removed (see figure 3J), and

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reflow having been applied to the layer of solder (see figure 3J, col. 9, lines 62-64).

Regarding to claim 31, the base of the torch bump having been created comprising:

A first layer of dry film (38) having been deposited over the surface of the layer of UMB;

The first layer dry film (38) having been patterned and developed, having created an opening (24) through the first layer of dry that aligned with the contact pad, having created a first mask of dry film, exposing the layer of UMB (16, see figure 3F); and

Successive layer of the metal (26/28/30) having been deposited over the exposed surface of the layer of UMB in accordance with the opening created through the first mask of dry film (see figures 3F-3H).

Regarding to claim 36, the layer of solder having been created by:

A second layer of dry film (22) having been deposited over the surface of the first layer of dry film (38) thereby including the surface of the base (16),

The second layer of dry film (22) having been patterned and developed, having created an opening through the second layer of dry film that aligns with the base of the torch bump, having created a second mask of dry film, having exposed the base of the torch bump (see figures 3E-3F), and

A layer of solder (26/28/30) having been developed in accordance with the opening created through the second mask of dry film (22).

Regarding to claim 41, additionally the layer of UMB having been etched using the created base of the torch bump and the created layer of the solder as a mask (see figures 3I-3J).

Regarding to claim 42, etching the layer of UBM comprising a wet etching process. the term "wet etching process" is method recitations in a device claimed, and they are non-limiting,

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because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 4-29, 46-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiu et al. (U.S. Patent No. 6,586,322) as applied to claims 30-31, 36, 41-42 above in view of the Admitted Prior Art of the Present Invention (pages 15-16) and Rinne (U.S. Patent No. 6,492,197).

Chiu et al. teaches all of the limitations as described in the claimed invention above. However, the reference does not teach the layer of UBM comprising nickel, forming a gold layer over the nickel layer, forming a solder layer of eutectic solder paste, and the thickness of the layers and the specific thickness and diameter of layer.

The Admitted Prior Art teaches forming layer of UBM comprising nickel (18, see page 4-5), a base of the solder ball comprising a layer of copper, a layer of nickel, followed by a layer of gold (pages 5-6).

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Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a base of the solder ball comprising a layer of copper, a layer of nickel, followed by a layer of gold in process of Chiu et al. as taught by the Admitted Prior Art because the process is known in the art to create a solder ball

Rinne teaches forming a solder layer by using eutectic solder paste (see abstract).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention of the invention was made would form a solder layer by using eutectic solder paste in process of Chiu et al. as taught by Rinne because the process would provide a high performance solder bump, also determining the optimum material for the layer only involved routine skill in the art.

The thickness range of the metal layers and the dry films are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller 105 USPQ233, 255 (CCPA 1955)*, the selection of reaction parameters such as temperature and concentration would have been obvious:

“Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed “critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”

In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

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Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any thickness range suitable to the method in process of Chiu et al. in order to optimize the process.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (See **MPEP 203.08**).



Thanh Nguyen
Patent Examiner
Patent Examining Group 2800

TTN